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COUNTY HEALTH FACTS No. 04-01

County Health Facts is a series of reports using CHIS 2001 data to describe the health status of California's counties.

HIGHLIGHTS:

About 5.9 percent of adults in California, nearly 1.5 million people, had diabetes in 2001.

About 83.2 percent of Californians with diabetes received one or more hemoglobin A1C tests during the survey year, and 60.4 percent received two or more tests.

Tulare County had the highest proportion of residents with diabetes of any California county, 9.9 percent.

Marin and El Dorado Counties had the lowest proportion of residents with diabetes, 3.7 percent.

Prevalence of Diabetes in California Counties, 2001

By Laura E. Lund, M.A.[1] and Gary He, PhD[2]

Diabetes, a disorder of the body's metabolism, is a chronic, incurable disease. Symptoms of diabetes include thirst, frequent urination, unexplained weight loss, fatigue, blurred vision, and slow healing of cuts and sores. Diabetes can cause serious health complications including heart disease, blindness, kidney failure, and lower-extremity amputations. Diabetes is the seventh leading cause of death in California, and the sixth leading cause of death in the United States.[3],[4]

The U.S. Department of Health and Human Services (DHHS) has made diabetes prevention and health promotion one of its top priorities. DHHS *Healthy People 2010* (HP2010) and the Division of Diabetes Translation at the Centers for Disease Control and Prevention (CDC) have established several multi-year national objectives to reduce the burden of diabetes in the U.S.[5,6] These objectives include decreasing the number of new cases of diabetes, decreasing the number of deaths attributable to diabetes, and increasing the number of people with diabetes who receive influenza and pneumococcal vaccinations, hemoglobin A1C tests, dilated eye exams, foot exams and other exams that detect or prevent problems caused by diabetes. In California, the State Department of Health Services Diabetes Prevention and Control Program (DPCP) works diligently with DHHS, CDC, and other partners to achieve these objectives.

This report presents data on diabetes in adults in California's counties. All data come from the California Health Interview Survey (CHIS 2001). (See "Methods" on page three for a description of the survey and analytic methods used in this report.) CHIS 2001 defined persons as having diabetes if a physician ever told them that they had the disease. This definition most likely results in an undercount of the total number of persons with diabetes, as it is estimated that only 70 percent of people with diabetes have been clinically diagnosed.7 The terms "rate", "percent", and "proportion" are used interchangeably throughout this report.

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[1] California Department of Health Services, Center for Health Statistics
[2] California Department of Health Services, Diabetes Prevention and Control Program
[3] State of California, Department of Health Services. *Vital Statistics of California, 2000*. November 2003. Sacramento, California.
[4] National Center for Health Statistics. *Fast Stats A to Z: Diabetes*. URL: http://www.cdc.gov/nchs/fastats/diabetes.htm. Accessed February 2004.
[5] United States Department of Health and Human Services. Health People 2010: Understanding and Improving Health. 2nd Ed. Washington D.C.: U.S. Government Printing Office. November 2000.
[6] Centers for Disease Control and Prevention. *Diabetes Prevention and Control: A Public Health Imperative.* URL: http://www.cdc.gov/nccdphp/promising_practices/diabetes/progress_to_date.htm. Accessed December 2003.
[7] National Diabetes Information Clearinghouse, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health. *National Diabetes Statistics.* URL: http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm#7. Accessed November 2003.

Diabetes Prevalence

Crude rates: Nearly 1.5 million Californians, or about 5.9 percent of all adults, had diabetes in 2001 (Table 1, page 5). There was considerable variation in diabetes rates across counties, from a low of 3.7 percent in Marin and El Dorado counties to a high of 9.9 percent in Tulare County.

Age-adjusted rates: After adjusting for differences in county age distributions, Marin County had the lowest percentage of persons with diabetes, 3.1 percent (Table 1), while Tulare County continued to have the highest rate, 10.5 percent. Comparing county rates with the overall California rate, seven counties or regions (Marin, El Dorado, Santa Cruz, San Francisco, Nevada/Plumas/Sierra, Sonoma, and Orange) had diabetes rates significantly below California's age-adjusted rate of 6.1 percent. Three counties (Kings, Imperial, and Tulare) had rates significantly higher than the State rate. HP2010 Objective 5-3 states that only 2.5 percent of the population will have clinically diagnosed diabetes. Only two counties, Marin and El Dorado, had diabetes rates for adults that achieved this objective.

Hemoglobin A1C Testing

The hemoglobin A1C test provides persons with diabetes and their health care providers with a summary measure of average blood sugar levels over a three-month period. CHIS asked persons with diabetes how many times a doctor tested their blood for hemoglobin A1C in the past year. About 10.2 percent of adults with diabetes didn't know how often they had an A1C test in 2001, and 13.9 percent had never heard of the A1C test. These persons were excluded from the findings presented below.

HP2010 Objective 5-12. HP2010 Objective 5-12 states that at least 50 percent of persons with diabetes will have a hemoglobin A1C test one or more times per year. About 83.2 percent of Californians with diabetes had one or more A1C tests in 2001 (Table 2, page 6). The Nevada/Plumas/Sierra region had the lowest rate of A1C testing, with 69.7 percent of people with diabetes receiving one or more A1C tests in the survey year. Sonoma County had the highest rate, 98.5 percent. Every county or region in California met or exceeded the HP2010 objective of 50 percent.

NIH recommendation for A1C testing. In addition to the minimum standards set by HP2010, the National Institutes of Health (NIH) advises persons with diabetes to test their hemoglobin A1C levels at least **two** times per year.[8] About 60.4 percent of Californians with diabetes had at least two hemoglobin A1C tests in 2001 (Table 3, page 7). El Dorado County residents with diabetes were the most likely to receive two or more A1C tests (81.1 percent). Tulare County had the lowest two-or-more A1C testing rate, 45.7 percent. Two counties (Sacramento and El Dorado) had rates that were significantly higher than the overall rate of 60.4 percent for California. There were no counties with a two-or-more hemoglobin A1C test rate significantly below the State rate. Although there is no HP2010 objective for this measure, using the 50 percent recommendation established by HP2010 Objective 5-12, every county or region in California met or exceeded a 50 percent threshold for this measure.

[8] National Diabetes Education Program, National Institutes of Health. *Know Your Numbers.* URL: http://ndep.nih.gov/diabetes/pubs/KnowNumbers_Eng.pdf. Accessed November 2003.

Summary

California did well in respect to the HP2010 objective for hemoglobin A1C testing, with 83.2 percent of people with diabetes receiving testing at appropriate intervals to monitor their disease. However, diabetes remains all too common in the State, with 5.9 percent of all adults diagnosed with the disease, much higher than the HP2010 objective of 2.5 percent. With more than 1.5 million Californians affected, the morbidity and mortality toll attributable to diabetes is quite large: diabetes is the seventh leading cause of death in the State, and can lead to blindness, kidney failure, nerve damage and amputation of the extremities.

Diabetes is a significant public health problem for counties throughout the state, with diabetes rates ranging from 3.7 percent in Marin and El Dorado Counties to 9.9 percent in Tulare County. Only two counties, Marin and El Dorado, had rates that achieved the HP2010 objective. Although rates of hemoglobin A1C testing varied significantly across counties, every county or region in the state met or exceeded the HP2010 objective for receiving at least one A1C test per year. Counties were equally successful in achieving a high proportion of persons with diabetes receiving two or more A1C tests per year, as recommended by NIH.

According to the CDC, Californians can reduce their risk for Type II diabetes by exercising regularly (30 minutes of moderate intensity physical activity per day, five days per week) and eating a healthy diet. For more information on diabetes activities in California, contact the California Diabetes Prevention and Control Program at (916) 552-9872, or www.caldiabetes.org.

Methods

Data: CHIS 2001 is a population-based household telephone survey, representative of the non-institutionalized adult population of California, with more than 55,000 Californians participating. In addition to statewide data, CHIS 2001 provides representative samples for California counties with populations greater than 100,000. For smaller counties, CHIS provides representative data estimates for contiguous county groups, referred to as "regions" in this report. Respondents to the survey were randomly selected California residents' aged 18 and older living in households with telephones. More information on the CHIS sample is available at http://www.chis.ucla.edu.

Analysis: In this report, both crude rates and age-adjusted rates are provided as measures of diabetes prevalence. Crude rates reflect the actual number of persons with diabetes in a county. However, since diabetes is much more common among older persons than in young adults, counties with a larger proportion of older persons will tend to have higher crude rates of diabetes than counties with fewer older persons. Age-adjustment statistically controls for these differences in county age structures. Therefore, age-adjusted rates rather than crude rates should be used for comparing prevalence differences between counties or between a county and the state. Age-adjusted rates have not been provided for hemoglobin A1C testing, since the presence of testing in persons with diabetes should not be affected by the age distribution of the county. Examining the relationship between age and hemoglobin A1C testing is beyond the scope of this report. The standard population used in calculating age-adjusted rates was the 2000 California population. Other details on the methods used to calculate crude and age-adjusted rates are available from the author.

The 95 percent confidence intervals (CIs) are presented for each rate. Because CHIS data are collected through a sampling method, there may be some random error in the rate estimate. The CIs represent the range of values likely to contain the "true" population rate 95 percent of the time. Rates are significantly different from each other when their confidence intervals do not overlap. When comparing county or State rates to HP2010 Objectives in this report, a rate is not considered significantly different from an HP2010 Objective if the confidence intervals of the rate include the target rate for the HP2010 objective.

Cases with missing information for diabetes were excluded from this analysis.

Limitations: The CHIS data are self-reported by respondents to the survey, and may be subject to error, such as respondent failure to recall information about existing health conditions. Only persons living in households with telephones were included in the survey. Participation in CHIS is voluntary: persons who refused to participate may be different than those who were interviewed. Details on response rates, respondent characteristics, and other survey information can be obtained at http:// www.chis.ucla.edu

For more information on CHIS 2001 contact: Laura E. Lund, CHIS Coordinator, California Department of Health Services, Center for Health Statistics, Office of Health Information and Research, MS 5103, PO Box 997410, Sacramento, CA 95899-7410.

TABLE 1
DIABETES PREVALENCE IN CALIFORNIA, BY COUNTY OR REGION, 2001

County of Residence	Age-adjusted Rate[1]	95% Confidence Interval		Crude Rate[1]	95% Confidence Interval		Estimated N[2]
		Lower	Upper		Lower	Upper	
HP2010 Objective 5-3	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**
Marin*	3.1	1.8	4.3	3.7	2.2	5.2	7,300
El Dorado*	3.2	2.1	4.2	3.7	2.3	5.0	4,500
Santa Cruz	4.0	2.7	5.2	3.9	2.6	5.2	7,600
Nevada/Plumas/Sierra	4.1	2.8	5.3	5.2	3.5	6.9	5,000
Sonoma	4.2	2.9	5.4	4.5	3.0	5.9	15,500
San Francisco	4.2	3.3	5.1	4.0	3.1	5.0	25,800
Placer	4.5	3.2	5.9	5.1	3.5	6.8	9,300
Orange	4.6	3.8	5.4	4.3	3.4	5.2	87,100
Ventura	4.8	3.6	6.1	4.9	3.5	6.2	26,500
Yolo	4.9	3.5	6.3	4.2	2.8	5.6	5,100
Monterey/San Benito	4.9	3.5	6.3	4.9	3.3	6.5	15,500
San Mateo	5.0	3.6	6.3	5.2	3.6	6.7	29,200
San Luis Obispo	5.1	3.7	6.5	5.5	3.9	7.2	11,000
Tuolumne/Calaveras/Amador/Inyo/ Mariposa/Mono/Alpine	5.1	3.6	6.6	6.3	4.5	8.1	9,000
Contra Costa	5.3	4.1	6.4	5.6	4.2	7.1	39,200
San Diego	5.4	4.6	6.2	5.2	4.3	6.1	110,700
Santa Clara	5.4	4.2	6.6	5.1	3.9	6.3	66,800
Santa Barbara	5.6	4.2	7.0	5.6	4.1	7.0	17,000
Butte	5.6	4.1	7.1	6.1	4.2	8.2	9,600
Mendocino, Lake	5.8	4.3	7.3	7.1	5.2	9.0	8,100
Siskiyou/Lassen/Trinity/Modoc	5.9	4.2	7.5	7.2	5.4	9.1	5,900
Shasta	6.0	4.1	7.9	6.6	4.8	8.5	8,700
Alameda	6.0	4.8	7.3	5.7	4.2	7.2	61,800
Napa	6.1	4.5	7.7	6.9	4.9	8.8	6,700
CALIFORNIA	**6.1**	**5.9**	**6.3**	**5.9**	**5.7**	**6.2**	**1,468,100**
Sacramento	6.3	5.0	7.7	6.2	4.7	7.6	54,000
Stanislaus	6.3	4.6	8.0	6.1	4.3	7.9	19,600
Tehama/Glenn/Colusa	6.5	4.9	8.0	7.0	5.1	8.9	5,500
Madera	6.6	4.9	8.2	6.7	4.9	8.5	6,000
Los Angeles	6.8	6.3	7.3	6.3	5.8	6.8	438,500
Solano	6.9	5.6	8.1	6.6	5.2	7.9	18,800
Kern	7.1	5.5	8.6	6.7	5.1	8.3	31,000
Humboldt/Del Norte	7.1	5.4	8.8	7.4	5.3	9.4	9,000
Riverside	7.2	5.8	8.6	7.6	6.0	9.1	83,300
San Bernardino	7.6	6.3	9.0	7.0	5.6	8.5	82,200
San Joaquin	7.7	6.0	9.3	7.6	5.9	9.4	31,000
Fresno	7.8	6.1	9.4	7.3	5.7	9.0	40,400
Merced	7.9	6.0	9.7	7.7	5.8	9.7	11,000
Sutter/Yuba	8.0	6.1	9.8	8.1	6.1	10.0	8,200
Kings	8.8	6.8	10.8	8.0	6.0	10.0	7,000
Imperial	8.9	6.8	10.9	9.0	6.6	11.4	9,500
Tulare	10.5	8.3	12.7	9.9	7.6	12.3	25,300

[1]Rate is per 100 county or State population.
[2]Estimated by multiplying the crude rate times the county or State population, rounded to the nearest hundred.

Sources: University of California at Los Angeles and State of California, Department of Health Services. 2001 California Health Interview Survey. State of California, Department of Finance. Race/Ethnic Population with Age and Sex Detail, 2000.
Prepared by: Department of Health Services, Center for Health Statistics.

*HP2010 Objective 5-3 falls within the 95 percent confidence interval for this county's rate.

TABLE 2
CALIFORNIA ADULTS WITH DIABETES RECEIVING ONE OR MORE HEMOGLOBIN A1C TESTS, BY COUNTY OR REGION, 2001

County of Residence	A1C Testing Rate1	95% Confidence Interval		Estimated N[2]
		Lower	Upper	
HP2010 Objective 5-12	**50.0**	**-**	**-**	**-**
Nevada/Plumas/Sierra	69.7	48.9	90.5	2,900
Tulare	72.0	58.1	85.9	11,600
Shasta	74.6	59.6	89.6	4,500
Kern	76.0	62.5	89.5	15,300
Contra Costa	76.2	59.6	92.8	20,300
Yolo	76.5	60.2	92.7	3,300
San Joaquin	78.1	66.7	89.4	16,800
Marin	79.1	51.1	100.0	3,200
Los Angeles	79.4	75.5	83.2	265,000
Napa	80.1	65.4	94.8	3,800
San Bernardino	80.1	70.1	90.2	54,300
Fresno	80.3	69.1	91.5	22,300
Merced	80.6	63.6	97.6	5,900
Santa Clara	81.2	70.3	92.0	46,700
Riverside	81.6	73.1	90.1	50,700
Madera	82.5	71.4	93.7	3,700
Humboldt/Del Norte	82.8	65.9	99.7	5,200
California	**83.2**	**81.3**	**85.1**	**928,100**
Mendocino/Lake	83.7	72.3	95.0	5,100
Ventura	84.1	72.7	95.4	19,100
Imperial	84.5	73.7	95.3	5,000
Sutter/Yuba	84.6	73.9	95.4	5,000
Tehama/Glenn/Colusa	84.9	74.3	95.4	3,200
Stanislaus	85.1	72.9	97.2	12,900
Solano	85.3	74.7	96.0	11,100
Monterey/San Benito	85.4	72.7	98.2	8,500
Siskiyou/Lassen/Trinity/Modoc	85.9	76.4	95.4	3,500
Tuolumne/Calaveras/Amador/Inyo/ Mariposa/Mono/Alpine	86.1	74.4	97.7	6,300
San Luis Obispo	86.8	74.0	99.6	7,300
San Diego	86.8	80.2	93.4	68,200
Orange	88.5	82.0	95.0	57,600
San Mateo	88.6	77.3	99.9	20,300
Butte	88.9	77.7	100.0	6,700
Alameda	89.8	81.9	97.7	43,400
Kings	90.1	81.5	98.8	4,300
San Francisco	91.3	83.2	99.4	18,700
El Dorado	92.3	79.5	100.0	3,700
Santa Cruz	93.8	85.1	100.0	5,700
Sacramento	94.1	88.9	99.3	44,500
Placer	94.6	88.4	100.0	7,100
Santa Barbara	96.0	90.6	100.0	12,600
Sonoma	98.5	96.3	100.0	13,100

[1]Rate is per 100 persons with diabetes, and excludes persons who refused to answer, didn't know how often they had been tested, or had never heard of the test.
[2]The number of persons receiving one or more A1C tests was calculated by estimating the proportion of the population with diabetes **and** one or more A1C tests, and multiplying that proportion times the county or State population, then rounding to the nearest hundred.

Sources: University of California at Los Angeles and State of California, Department of Health Services. 2001 California Health Interview Survey.
State of California, Department of Finance. Race/Ethnic Population with Age and Sex Detail, 2000.
Prepared by: Department of Health Services, Center for Health Statistics.

TABLE 3
CALIFORNIA ADULTS WITH DIABETES RECEIVING TWO OR MORE HEMOGLOBIN A1C TESTS, BY COUNTY OR REGION, 2001

County of Residence	A1C Testing Rate1	95% Confidence Interval		Estimated N[2]
		Lower	Upper	
Tulare	45.7	30.8	60.6	7,300
Shasta	50.8	34.3	67.2	3,100
Kern	51.2	35.8	66.6	10,300
Stanislaus	51.8	34.5	69.1	7,900
Nevada/Plumas/Sierra	52.3	32.8	71.7	2,100
Marin	53.4	21.7	85.2	2,200
Fresno	53.6	39.2	68.0	14,900
Ventura	53.9	38.9	69.0	12,200
San Mateo	54.8	37.0	72.8	12,600
Los Angeles	56.3	51.6	60.9	187,900
Contra Costa	56.3	39.7	73.0	15,000
Santa Clara	57.9	44.6	71.3	33,300
Kings	59.7	43.8	75.6	2,800
Humboldt/Del Norte	59.8	41.7	78.0	3,800
Siskiyou/Lassen/Trinity/Modoc	59.9	44.8	75.1	2,500
Riverside	60.2	48.4	72.0	37,400
California	**60.4**	**58.0**	**62.9**	**673,000**
San Bernardino	60.6	49.0	72.3	41,100
San Luis Obispo	61.0	44.0	78.0	5,100
San Francisco	61.0	47.5	74.5	12,500
Merced	61.9	44.1	79.7	4,500
Yolo	62.5	44.8	80.2	2,700
Tehama/Glenn/Colusa	62.6	47.7	77.4	2,400
Imperial	64.1	48.0	80.1	3,800
San Diego	64.4	54.2	74.6	50,600
Solano	64.9	52.1	77.7	8,400
San Joaquin	65.0	52.3	77.7	14,000
Sutter/Yuba	65.2	51.2	79.2	3,900
Orange	65.4	54.4	76.4	42,600
Sonoma	65.5	48.6	82.4	8,700
Alameda	66.6	53.1	80.0	32,100
Tuolumne/Calaveras/Amador/ Inyo/Mariposa/Mono/Alpine	68.5	52.8	84.1	5,000
Napa	68.6	52.7	84.5	3,200
Madera	68.6	54.5	82.7	3,000
Santa Cruz	70.2	49.9	90.6	4,300
Placer	70.9	54.7	87.1	5,300
Monterey/San Benito	71.2	54.0	88.5	7,100
Mendocino/Lake	71.8	57.9	85.6	4,400
Santa Barbara	71.8	57.2	86.4	9,400
Butte	73.5	58.0	89.0	5,500
Sacramento	75.7	64.0	87.4	35,800
El Dorado	81.1	64.3	97.9	3,200

[1]Rate is per 100 persons with diabetes, and excludes persons who refused to answer, didn't know how often they had been tested, or had never heard of the test.
[2]The number of persons receiving two or more A1C tests was calculated by estimating the proportion of the population with diabetes **and** two or more A1C tests, and multiplying that proportion times the county or State population.

Sources: University of California at Los Angeles and State of California, Department of Health Services. 2001 California Health Interview Survey.
State of California, Department of Finance. Race/Ethnic Population with Age and Sex Detail, 2000.
Prepared by: Department of Health Services, Center for Health Statistics.